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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Folding Trailer

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(73) Same as inventor

(57) 15 Claims

5,083,3/86

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Canada

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"Folding Trailer"

"Abstract of the Disclosure"

In a first embodiment, there is provided a folding trailer adapted for towing by a bicycle or the like. The trailer is easily convertible for use as a stroller or jogger. The trailer is characterized by the provision of a unique suspension system which is activated only by the placement of a load on the seat. A novel hitch is utilized which is functional to maintain the trailer in the upright position even when the bicycle lies on its side.

FIELD OF THE INVENTION

The present invention relates to a folding trailer. In one aspect, the trailer is adapted for towing by means of a bicycle. In a second aspect the trailer may be easily converted into a stroller or jogger, rickshaw or sled.

BACKGROUND OF THE INVENTION

Trailers functional to be towed by means of a bicycle are well known in the art. Typically, such trailers are used for carrying children or for the transportation of goods. Commercially available trailers would be like those manufactured by Burley Design Cooperative, of 40 80 Stewart Rd., Eugene, Oregon 97402 U.S.A. or Orby, Outillage de Precision Drummond Inc., 360, Labonte, Drummondville, Quebec, Canada. In both cases, the trailer may also be detached from the bicycle and converted into a stroller.

Typically, the more expensive trailers on the market are attached to the bicycle at the rear triangle, i.e. the chain stay. In addition to this hitch, there is usually provided a flexible attachment which attempts to keep the trailer upright should an accident occur, or the bicycle fall, or be laid over on its side.

One of the drawbacks of such trailers resides in the complexity of the attachment required to secure the trailer to the chain stay thus increasing the probability of damaging or losing parts. Often tightening or adjustment of the hitch is required making the hitching process lengthier and more tedious. Additionally, the flexible section of the hitch is separate from the actual hitch, thus increasing the possibility of mechanical failure.

Usually, the less expensive trailers are attached to the seat post, and are not provided with a flexible attachment. However, in all probability this type of trailer would not tip up, should the bicycle be positioned on its side, but the mechanical stresses would be such as to result in damage or bending thereof. Deleteriously, utilization of inflexible seat post hitch attachments results in reduced safety and performance characteristics.

The major disadvantages associated with the commercially available units reside in their complexity of manufacture, which usually involves welding, the labour intensity and time consumption involved in attaching and detaching the trailers from the bicycles and collapsing and reassembling them, and their expense.

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Before successfully developing the subject matter forming the instant application, the building of several prototypes was necessitated. Problems were encountered in delineating the frame geometry and angularity thereof so as to effect folding. Problems arose, too, in determining the centre of balance and load bearing location over the axles. In particular, the evolution of an operative hitch proved most difficult because of length considerations, the nature of the resilient connection and the like.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a folding trailer which is adapted for towing by means of a bicycle. Furthermore, the trailer is easily and rapidly convertible into a stroller or jogger. In a third aspect of the invention the trailer may be converted to a rickshaw or sled.

More specifically, the trailer comprises a main frame formed of two sections of tubing, upper and lower, which are pivotally connected one to another adjacent their forward ends. The lower section has upwardly angled open-ended sections adapted to receive either a height adjustable hitch section, or a height adjustable handle section depending upon the manner in which the trailer is to be utilized. The lower section has generally horizontal open-ended sections when the hitch section is being connected to the chain stay. A roll bar, in the shape of an inverted-u, is pivotally mounted on the lower frame. At its upper end, the roll bar is secured by means of releasable pins to spaced apart opposed sides of the upper frame section.

A unique suspension system comprising a generally rectangular tubing is provided which pivots vertically about the lower frame. More specifically, two pairs of compression springs or the like, exemplary of which would be ring mountings, one pair being at the front and the other being at the rear, are sandwiched between the main frame and the suspension member. A piece of material is secured between the rear bar of the upper frame section and the front of the suspension frame thereby forming the seat member. Alternatively, the material may be secured to the upper bar of the roll bar and the front of the suspension frame where by altering the position of the roll bar, the seat may be directionally reversible. As a result of this arrangement, in either case, the suspension system is only activated with load placement on the seat.

Preferably, an outer water resistant protective material shell is secured to the frame to thereby provide an all-weather vehicle.

In two embodiments of the invention, namely those in which it is being utilized as a trailer either for attachment to the chain stay (in which case no insertable height adjustment frame portion would be required) or for attachment to the seat post (in which case the height adjustment frame portion would be required), a novel hitch is provided. More specifically, the hitch comprises an elongate tubing member adapted for engagement, in the

first afore-mentioned embodiment, with one of the open-end front lower frame arms or, in the second afore-mentioned case, is pivotally mounted at the front of the height adjustment section of the frame. Said height adjustment section is particularly required in the instance when the trailer is being utilized as a stroller. A resilient member is inserted a predetermined distance into said elongate tubing and secured thereto. The resilient member is formed of a suitable material, exemplary of which would be a polyurethane having a specific hardness. At its outer end, said resilient member defines a v-shaped face which is adapted to engage either the seat post, or the chain stay. Means, for releasably securing said resilient member, preferably in the form of a pair of mating velcro straps are utilized to secure the member to the bicycle. In the embodiment wherein the hitch is attached to the chain stay, it is necessary to provide a safety strap to ensure that the securing means do not become loosened.

In the embodiment of the invention wherein the trailer is utilized as a stroller or jogger it is evident that the hitch is not required. It may either be detached from the trailer or alternatively, depending upon the mounting, be rotated from the horizontal position. When in use in this mode, a third wheel is utilized. The third wheel is releasably, or foldably, pivotally and rotatably mounted at the front section of the frame. Preferably, this wheel would have the same diameter as that of the other wheels so that advantageously, it could be used as a spare (in the trailer mode), or in the stroller mode would render it better suited to cover varying and uneven terrains.

The advantages of the present invention are as follows:

The unique frame structure wherein the upper frame section is slightly larger (approximately 2") than the lower frame section, and wherein removal of the releasable pins on the roll bar permits the frame to be mechanically simply and rapidly folded and reassembled. Furthermore, no welding whatsoever of the frame is required. Additionally, the configuration of the frame provides for a very wide headroom area for any passengers.

The unique hitch mechanism is functional to provide a connection between the trailer and the bike which permits side to side swivelling of said trailer, whilst at the same time substantially restricting movement in a vertical plane. Rotation about a longitudinal axis is desirable for turning or cornering, however, up and down movement must be eliminated so as to maintain the stability of the trailer. Although, in hindsight simple, the use of mating velcro straps as the hitch securement means, is not only surprisingly effective but is also

inexpensive and makes the bicycle-trailer connection remarkably labour free. The particular v-shaped face and resilient member inserted into the cylindrical member of the hitch provides for flexing of the hitch in the desired direction.

Thus, a versatile, collapsible, inexpensive easy to manufacture yet stable and safe vehicle has been provided.

In a first broad aspect of the invention there is provided a folding trailer which comprises a frame having an upper section formed of tubing, said upper section being generally rectangular in shape with the front portion thereof being downwardly angled and a lower generally u-shaped section formed of tubing, said lower section having the forward arms thereof open-ended, wherein said upper and lower sections are pivotally connected one to another on opposed sides adjacent their forward ends and a generally inverted u-shaped roll bar formed of tubing, said bar being pivotally mounted on opposed sides of said lower section and said bar further being releasably secured to said frame upper section upon opposed sides thereof, whereupon release of said bar, the latter rotates forwardly and the upper section rotates downwardly to thereby fold said trailer into a compact condition; a rectangular suspension member formed of tubing, said suspension member being pivotally associated with said lower frame member; and a seat member associated with said frame and said suspension member.

In a second broad aspect of the invention there is provided a folding trailer adapted for towing by a bicycle which comprises: a frame having an upper section formed of tubing, said upper section being generally rectangular in shape with the front portion thereof being downwardly angled and a lower generally u-shaped section formed of tubing, wherein said upper and lower sections are pivotally connected one to another on opposed sides adjacent their forward ends and a generally inverted u-shaped roll bar formed of tubing, said bar being pivotally mounted on opposed sides of said lower section and said bar further being releasably secured to said frame upper section upon opposed sides thereof, whereupon release of said bar, the latter rotates forwardly and the upper section rotates downwardly to thereby fold said trailer into a compact condition; a rectangular suspension member formed of tubing, said suspension member being pivotally associated with said lower frame member; a pair of free floating axles mounted on opposed sides of said suspension system; a pair of wheels positioned on said axles; a seat member associated with said frame and said suspension

member; and a hitch member, associated with the lower frame section, said hitch being functional to connect said trailer to said bicycle.

In a third broad aspect of the invention there is provided a folding stroller which comprises: a frame having an upper section formed of tubing, said upper section being generally rectangular in shape with the front portion thereof being downwardly angled and a lower generally u-shaped section formed of tubing, said lower section having the forward open-ended arms thereof angled upwardly and wherein said upper and lower sections are pivotally connected one to another on opposed sides adjacent their forward ends, a u-shaped height adjustment tubing member adapted for releasable insertion into the open ends of the frame arms, a generally inverted u-shaped roll bar formed of tubing, said bar being pivotally mounted on opposed sides of said lower section and said bar further being releasably secured to said frame upper section upon opposed sides thereof, where upon release of said bar, the latter rotates downwardly to thereby fold said trailer into a compact condition; a rectangular suspension member formed of tubing, said suspension member being pivotally associated with said lower frame member; a pair of free floating axles mounted on opposed sides of said suspension system; a pair of wheels releasably mounted on said axles; a seat member associated with said roll bar and said suspension member; and a third wheel pivotally, rotatably and releasably mounted at the forward end of said trailer, said wheel being movable between a ground-engaging position and a stored position, said wheel being substantially the same diameter as said pair of wheels.

Description of the Drawings

Figure 1 is a perspective view of the trailer of a first embodiment of the invention without the outer protective cover.

Figure 2 is a side-sectional view of the trailer of the first embodiment of figure 1 in the operative position.

Figure 3 is a side-sectional view of the trailer of figure 1 in the folded position.

Figure 4 is a side view of the hitch of the trailer of figure 2.

Figure 5 is a perspective view of the hitch of figure 4.

Figure 6 is a detailed view of the hitch in the operative position.

Figure 7 is a perspective view of a second embodiment of the invention.

Figure 8 is a perspective view of the stroller of the invention.

Figure 9 is a side sectional view of the third wheel in the operative position.

Figure 10 is a side view of the third wheel in the stored position.

Figure 11 is a plan view of the third wheel.

Description of the Preferred Embodiment

Having reference to the accompanying drawings there are provided the three embodiments of the trailer and/or stroller jogger 1, 2 and 3 respectively.

A frame 4, formed of aluminum tubing is provided. Preferably, the tubing has an o.d. of 1" and, more specifically, would be 6063 T52 having a wall thickness of 0.065". The frame 4 comprises an upper section 5, which is generally rectangular, having side arms 5a and 5b respectively, which are angled downwardly at their forward ends 5c. A lower frame section 6, which is narrower than the upper section 5 is connected thereto at swivel points 7. The lower frame section 6 defines side arms 6a and 6b respectively which at their forward ends form open-ended arms.

In the first embodiment of the invention 1, wherein the trailer is hitched to the chain stay of the bicycle, the hitch arm 8 (to be described hereinafter) is directly slotted into the lower frame arms 6a and 6b and secured thereto by means of a releasable pin 9.

In the second embodiment 2, wherein the trailer is hitched to the seat post of the bicycle, an inverted u-shaped height adjustment handle 10 is inserted into the open ends of frame arms 6a and 6b, and secured therein by means of releasable pins 11 insertable into

a series of apertures 12 defined in said arms 6a and 6b. The hitch arm 8 is pivotally mounted at the centre of the handle 10.

In the third embodiment 3 of the invention, wherein the trailer is utilized as a stroller, the height adjustment handle 10 is utilized. However, it is optional as to whether the hitch arm 8 is utilized or whether it is rotated out of the way.

A roll bar 13, having an inverted u-shape is pivotally mounted on the side arms 6a and 6b utilizing deck hinges 14 and inside eye ends 15. The roll bar 13 is releasably connected to the upper frame side arms 5a and 5b by means of removable pins 16.

A rectangular suspension member 17, formed of tubing, is positioned externally of the frame 4. The suspension member 17 pivots about the lower frame 6 by the provision of ring mountings 18 (or compression springs or the like). A pair of brackets 19 are on the suspension member 17 and frame 6. A free floating axle 20 engages a hub 21. Wheels 22 are positioned on said axles 20.

Referring in particular to figures 4 and 5, the hitch arm 8 comprises an elongate tubing member 23 having a resilient member 24 associated therewith. More specifically, the resilient member 24, which is formed of a polyether-based polyurethane having a hardness of 95 shore A, like that manufactured by Western Polymers of Calgary, Alberta, Canada, comprises an elongate tubular section 24a defining an inner bore 24b. The bore 24b is functional to increase the flexibility of member 24. At its outer end, the member 24 forms a v-shaped notch 25 adapted to engage the appropriate bicycle post 26. The V is cut at an angle of 105°. Preferably, the notch is angled at 72.5° to the horizontal to thereby fit all sized seat posts. The tubular section 24a is secured inside member 23 by means of a bolt 27 extending a distance of about 3" therein to thereby permit of twisting of the section 24a. A 2" nylon strap 28 having a velcro end 28a is secured to member 24. A mating velcro end 29 is also secured on said member 24 by means of bolts 30. In the embodiment wherein the trailer is attached to the chain stay it is necessary to provide a safety strap 50.

A third wheel 31 is provided for the third embodiment 3. Referring now to figures 9, 10 and 11, the third wheel 54 is mounted on a wheel support yoke 76 and secured therein by a bolt 78. A hinge block 58 is pivotally mounted on the yoke 76 by means of a pin 60, and secured therein using a washer 70 and wing nut 72. A spring 64, mounted on a bolt 62 extends through an aperture in the frame 5c into the hinge block 58 and threadedly

engages pin 60. It will be seen that when in the stored position, the rear of yoke 76, namely shoulders 57, and rear of hinge at shoulders 56 and rear of block 58 at 59 will be in abutment with the frame to thereby secure the wheel 54 in the stored position.

A seat member 35 is formed by securing material to the frame 6 and the front bar of the suspension member 17. Alternatively, the material may be secured to the roll bar and the suspension member to thus render the seat directionally reversible. An outer protective shell 36 is optionally provided, formed of a suitable weatherproof material.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE ARE CLAIMED ARE DEFINED AS FOLLOWS:

1. A folding trailer which comprises:
a frame having an upper section formed of tubing, said upper section being generally rectangular in shape with the front portion thereof being downwardly angled and a lower generally u-shaped section formed of tubing, said lower section having forward open-ended arms and wherein said upper and lower sections are pivotally connected one to another on opposed sides adjacent their forward ends and a generally inverted u-shaped roll bar formed of tubing, said bar being pivotally mounted on opposed sides of said lower section and said bar further being releasably secured to said frame upper section upon opposed sides thereof, whereupon release of said bar, the latter rotates forwardly and the upper section rotates downwardly to thereby fold said trailer into a compact condition;

a rectangular suspension member formed of tubing, said suspension member being pivotally associated with said lower frame member; and

a seat member associated with said frame and said suspension member.
2. A folding trailer as set forth in claim 1 further comprising handle means associated with said open-ended arms.
3. A folding trailer as set forth in claims 1 or 2 further comprising ski members pivotally connected to opposed sides of said suspension member.
4. The trailer as set forth in claims 1, 2 or 3 further comprising a protective outer shell associated with said frame.
5. A folding trailer adapted for towing by a bicycle which comprises:
a frame having an upper section formed of tubing, said upper section being generally rectangular in shape with the front portion thereof being downwardly

angled and a lower generally u-shaped section formed of tubing, said lower section having forward open-ended arms and wherein said upper and lower sections are pivotally connected one to another on opposed sides adjacent their forward ends and a generally inverted u-shaped roll bar formed of tubing, said bar being pivotally mounted on opposed sides of said lower section and said bar further being releasably secured to said frame upper section upon opposed sides thereof, whereupon release of said bar, the latter rotates forwardly and the upper section rotates downwardly to thereby fold said trailer into a compact condition;

a rectangular suspension member formed of tubing, said suspension member being pivotally associated with said lower frame member;

a pair of free floating axles mounted on opposed sides of said suspension system;

a pair of wheels positioned on said axles;

a seat member associated with said frame and said suspension member; and

a hitch member, associated with the lower frame section, said hitch being functional to connect said trailer to said bicycle.

6. The trailer as set forth in claim 5 further comprising a protective outer shell associated with said frame.
7. The trailer as set forth in claims 1 and 5 further comprising height adjustment means associated with said frame.
8. The trailer as set forth in claims 5, 6 or 7 wherein said hitch member comprises an elongate cylindrical member associated with said frame member and a resilient member mounted a predetermined distance within said cylindrical

member, said resilient member defining a v-shape at its outer end being adapted to engage attachment members on said bicycle and means for releasably securing said hitch member to said bicycle.

9. A folding stroller which comprises:

a frame having an upper section formed of tubing, said upper section being generally rectangular in shape with the front portion thereof being downwardly angled and a lower generally u-shaped section formed of tubing, said lower section having the forward open-ended arms thereof angled upwardly and wherein said upper and lower sections are pivotally connected one to another on opposed sides adjacent their forward ends, a u-shaped height adjustment tubing member adapted for releasable insertion into the open ends of the frame arms, a generally inverted u-shaped roll bar formed of tubing, said bar being pivotally mounted on opposed sides of said lower section and said bar further being releasably secured to said frame upper section upon opposed sides thereof, where upon release of said bar, the later rotates downwardly to thereby fold said trailer into a compact condition;

a rectangular suspension member formed of tubing, said suspension member being pivotally associated with said lower frame member;

a pair of free floating axles mounted on opposed sides of said suspension system;

a pair of wheels releasably mounted on said axles;

a seat member associated with frame and said suspension member; and

a third wheel pivotally, rotatably and releasably mounted at the forward end of said trailer, said wheel being movable between a ground-engaging position and

a stored position, said wheel being substantially the same diameter as said pair of wheels.

10. The trailer as set forth in claim 9 further comprising a protective outer shell associated with said frame.
11. The trailer as set forth in claims 9 or 10 further comprising height adjustment means associated with said frame.
12. The trailer as set forth in claim 8 wherein said resilient member is formed of polyurethane.
13. The trailer as set forth in claims 8 and 12 wherein said releasable securing means comprises mating velcro strips.
14. The trailer as set forth in claims 1 or 9 further comprising means for reversing the directional facing of said seat member, wherein said material is attached to said roll bar and said suspension member.
15. The stroller as set forth in claim 9, further comprising means for reversing the directional facing of said seat member.

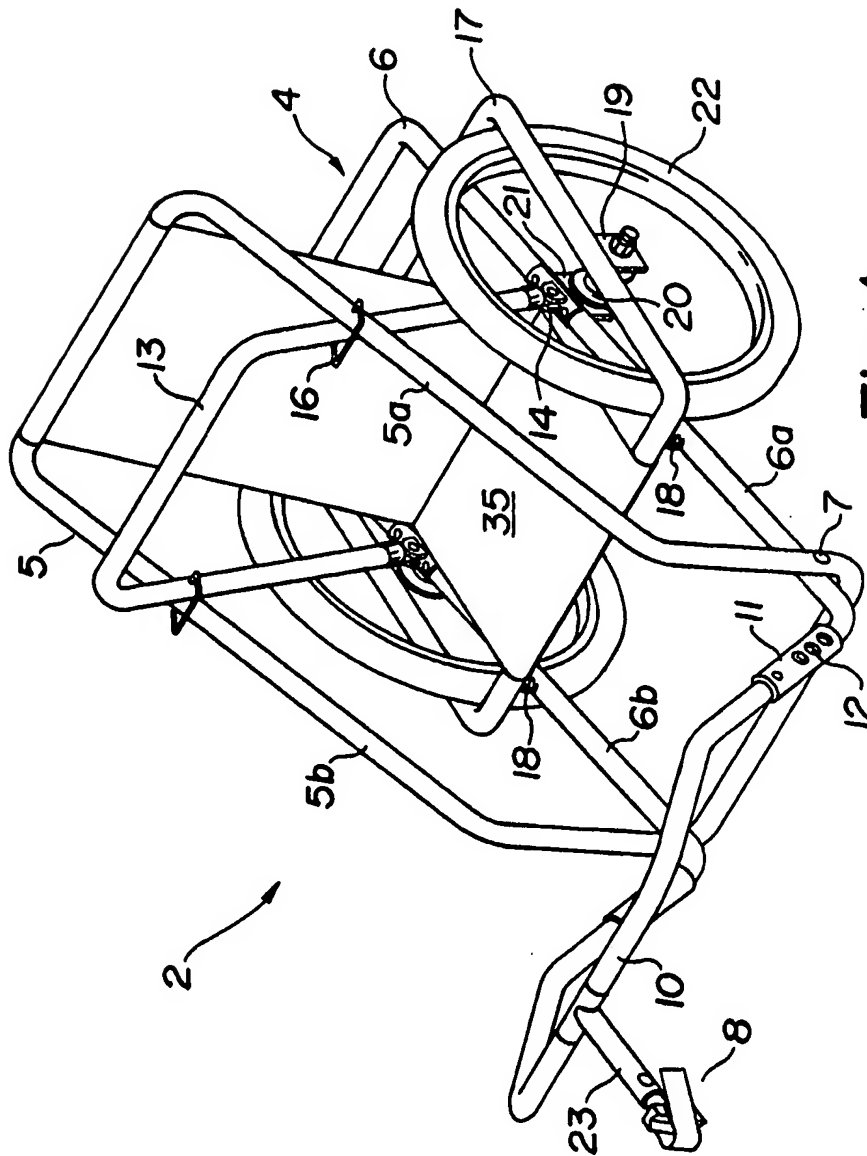
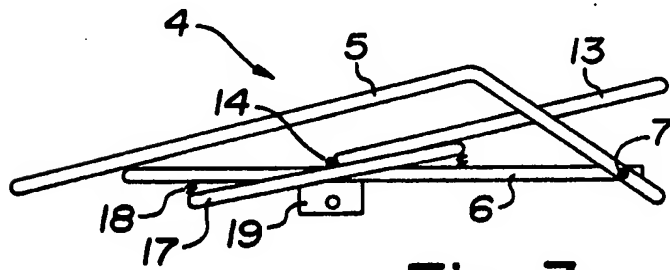
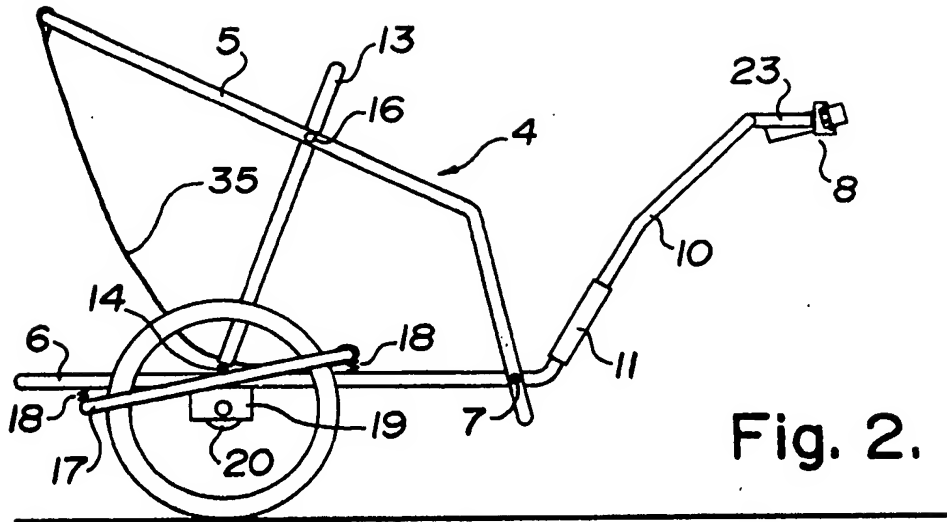


Fig. 1.

J. K. Kofod
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J. P. Keefat
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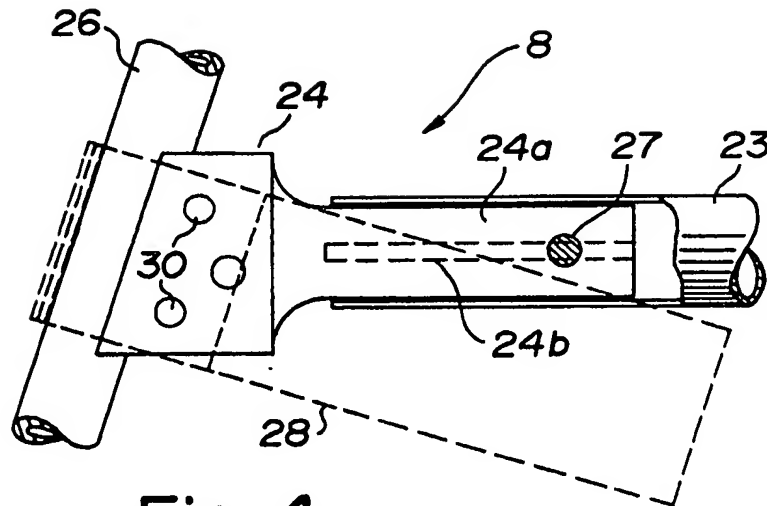


Fig. 4.

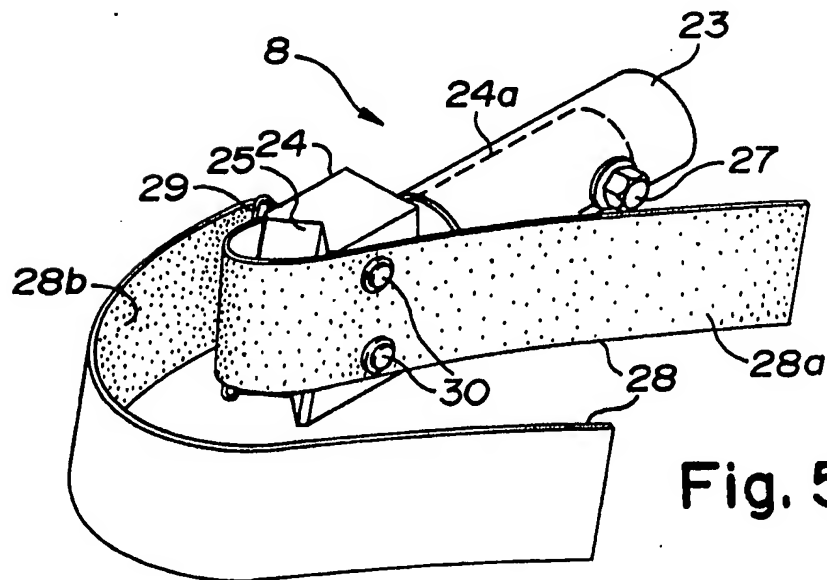
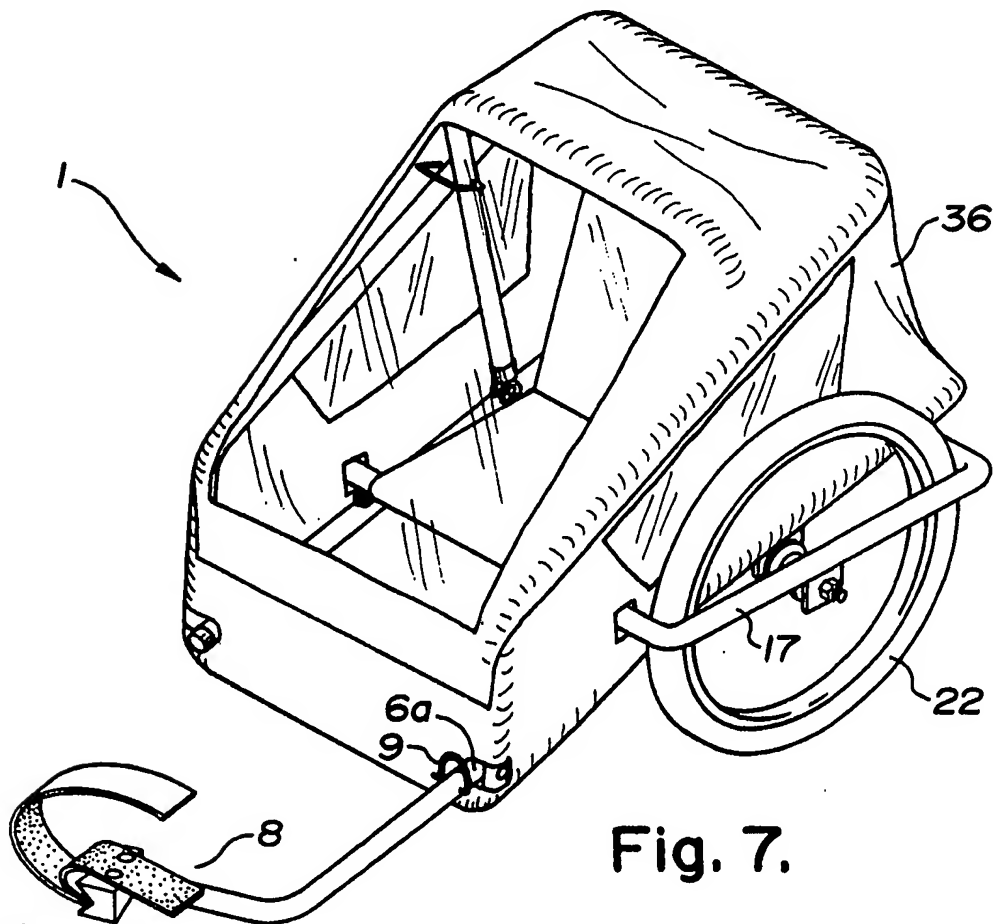
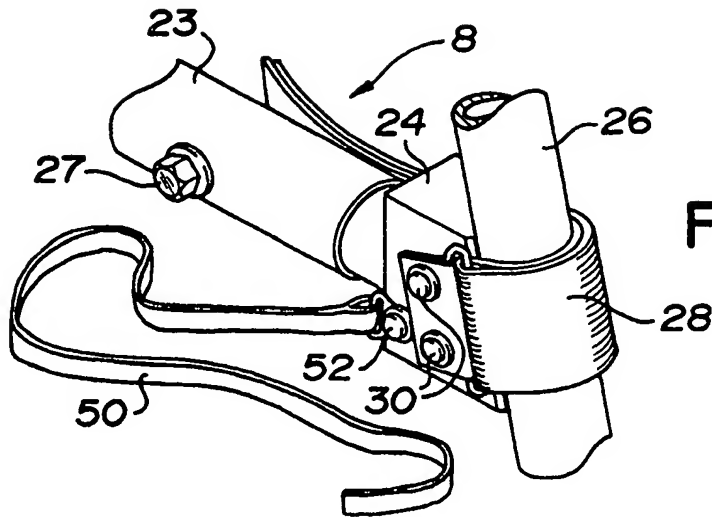


Fig. 5.

J. P. Kayat
PATENT AGENT

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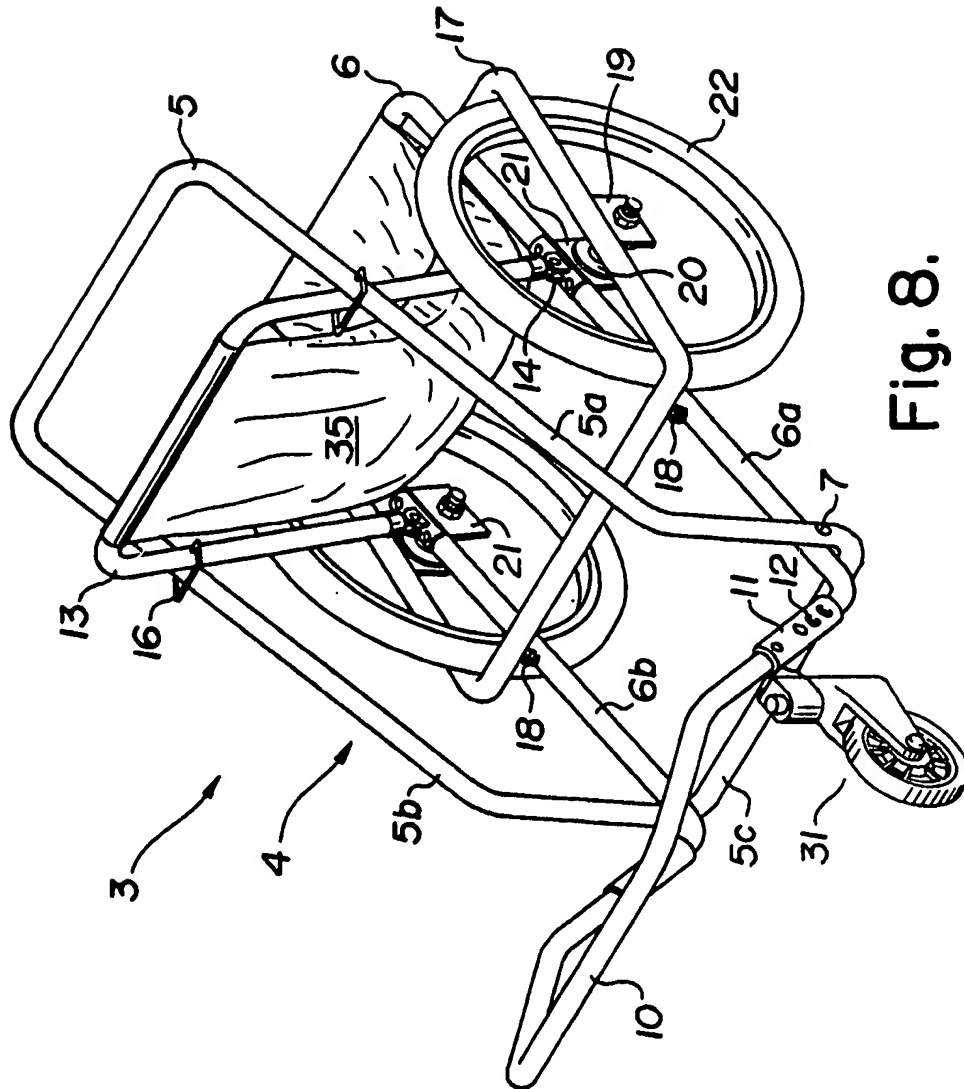


Fig. 8.

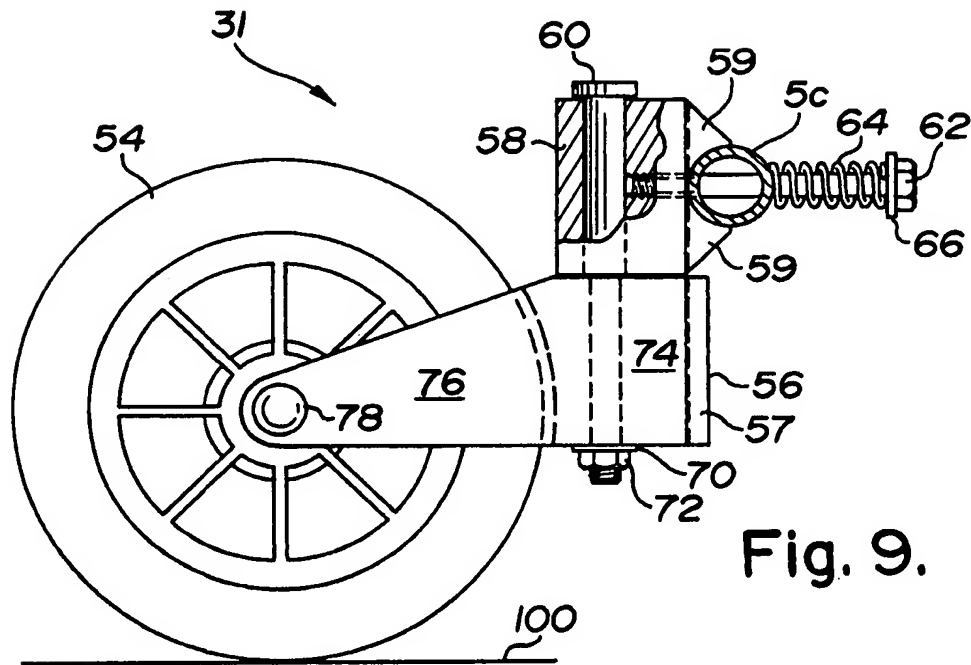


Fig. 9.

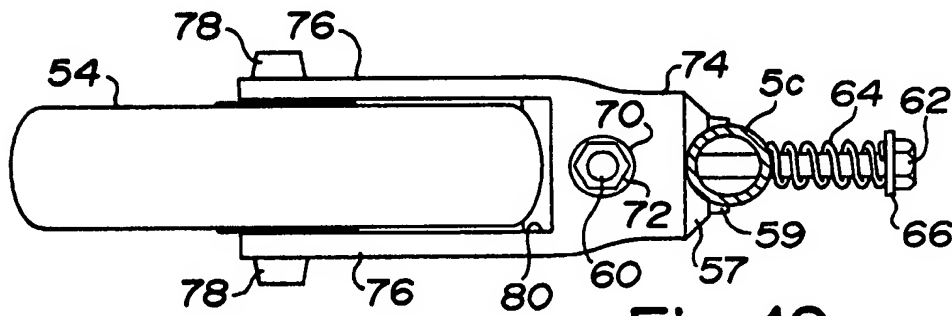


Fig. 10.

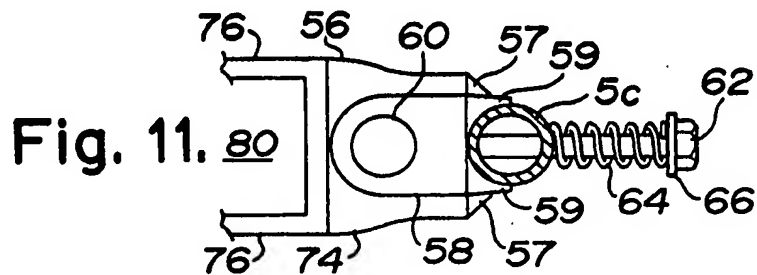


Fig. 11.

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